CONTENTS, VOLUME 4, 1972

**U.S. IBP Tundra Biome Research**

A Preliminary Model of Processes Affecting Primary Production in the Arctic Tundra
PHILIP C. MILLER AND LARRY TIESZEN ..... 1

Mathematical Modeling and Validation of the Thermal Regimes in Tundra Soils, Barrow, Alaska
YOSHISUKE NAKANO AND JERRY BROWN ..... 19

Biologically Effective Solar Ultraviolet Irradiation in the Arctic
MARTIN M. CALDWELL ..... 39

**Papers**

Quarternary History of Northern Cumberland Peninsula, Baffin Island, N. W. T., Canada: Part IV: Maps of the Present Glaciation Limits and Lowest Equilibrium Line Altitude for North and South Baffin Island
J. T. ANDREWS AND G. H. MILLER ..... 45

Recent Climatic Change and Development of the Bristlecone Pine (*P. longaeva* Bailey) Krummholz Zone, Mt. Washington, Nevada
VALMORE C. LAMARCHE, JR. AND HAROLD A MOONEY ..... 61

Ice Margins of the 19th and 20th Centuries in the Venedigergruppe, Hohe Tauren, Austria
J. A. T. YOUNG ..... 73

**Note**

Winter Protalus Mounds: Brooks Range, Alaska
W. E. YEEND ..... 85

**Book Reviews** ..... 89

**Papers**

Deglaciation and Isostasy in the Sukkertoppen Ice Cap Area, West Greenland
DAVID SUGDEN ..... 97

Neoglacial Facies in the Colorado Front Range
RICHARD F. MADOLE ..... 119

The Incidence of Landslides, Avalanches, and Floods in Western Norway during the Little Ice Age
JEAN M. GROVE ..... 131

Subalpine Soil Temperature Regimes in Southwestern British Columbia
T. M. BALLARD ..... 139

Subalpine Plant Communities of the Western North Cascades, Washington
GEORGE W. DOUGLAS ..... 147

Arthropod Fallout on Alaskan Snow
JOHN S. EDWARDS ..... 167

**Book Reviews** ..... 177

**U.S. IBP Tundra Biome Research**

Simulations of Meteorological Variation over Arctic Coastal Tundra under Various Physical Interface Conditions
NORMAN W. LORD, JOSEPH P. PANDOLFO, AND MARSHALL A. ATWATER ..... 189

**Papers**

Mass Balance Studies on McCall Glacier, Brooks Range, Alaska
G. WENDLER, C. FAHL, AND S. CORBIN ..... 211

Bioenergetics of the Snowy Owl (*Nyctea scandiaca*)
JAMES A. GESSAMAN ..... 223

Distribution of Selected Chemical Elements in Even-Aged Alder (*Alnus*) Ecosystems near Fairbanks, Alaska
KEITH VAN CLEVE AND LESLIE A. VIERECK ..... 239

Microorganisms in Frost Scars
WILLIAM L. BOYD AND JOSEPHINE W. BOYD ..... 257

The Quaternary History of Northern Cumberland Peninsula, East Baffin Island, N. W. T. Part X: Radiocarbon Date List
J. T. ANDREWS AND G. H. MILLER ..... 261

**Book Reviews** ..... 279

**Correspondence**

Classification of Organic Soils
J. H. DAY ..... 238

Classification of Organic Soils: reply to comments of Mr. John H. Day
K. A. EVERETT ..... 238

**Information** ..... 284

**Editorial**

INSTAAR'S Avalanche Research Project in Southwestern Colorado
J. D. IVES ..... 289

**IBP Tundra Biome Research**

Vegetation Types and Plant Biomass in Tundra
F. E. WIELGOLASKI ..... 289

The Seasonal Course of Aboveground Production and Chlorophyll Distribution in a Wet Arctic Tundra at Barrow, Alaska
L. L. TIESZEN ..... 307

**Papers**

A Partial Holocene Pedological and Archaeological Record from the Southern Alberta Rocky Mountains
B. O. K. REEVES AND J. F. DORMAAR ..... 325

Debris Slopes as Series
JOHN THORNES ..... 337

**Short Papers**

The Eskimo Place Names of Northern Cumberland Peninsula from Home Bay to Cape Dyer, Baffin Island, N. W. T., Canada, with English Translations
K. F. DUDLEY ..... 343

Differences in Ablation of Three Adjacent Alpine Glaciers, Indian Peaks Region, Front Range, Colorado
CHARLES COFER ..... 349

Audubon: New Name for Colorado Front Range Neoglacial Deposits Formerly Called "Arikaree"
W. C. MAHANEY ..... 355

**Correspondence**

The Problems of Inversion in Estimating the Height of Glaciation Limits in Arctic Regions
RAYMOND S. BRADLEY ..... 364

Venedigergruppe, Hohe Tauern, Austria
G. PATZELT ..... 360

Venedigergruppe, Hohe Tauern, Austria: reply to Dr. G. Patzelt's comments
J. A. T. YOUNG ..... 362

**Book Reviews** ..... 364

**Information** ..... 366

**Contents and Index for Volume 4** ..... 369

# INDEX FOR VOLUME 4


Ablation: Colorado Front Range, 349-353; Venedigergruppe, Austria, 75-82
Arctic: chlorophyll distribution, 307-322; Eskimo place names, Baffin Island, 343-347; inversions, 359-360; meteorology, 189-207; primary production, 1-18; soil thermal regimes, 19-38; solar ultraviolet radiation, 39-42
Alaska: alder ecosystems, 239-254; Barrow, 4-5, 19-38, 40-42, 189-208; chlorophyll distribution, 307-322; insects, 167-176; mass balance, Brooks Range, 211-220; soil thermal regimes, 19-38; solar ultraviolet radiation, 39-42; primary production, 1-18; 307-322; protalus mounds, Brooks Range, 85-87; snowy owl, 223-236
Alluvial soil, in alder ecosystems, 240, 242, 249-250
*Alnus*, 239-254
Andrews, J. T. *A Geomorphological Study of Post-Glacial Uplift with Reference to Arctic Canada* (review), *W. Barr*, 89-90; (review—*Radiocarbon Variations and Absolute Chronology*), 281-285
Andrews, J. T. and Miller, G. H. (Quaternary history of northern Cumberland Peninsula, Baffin Island, N. W. T., Canada: Part IV: Maps of the present glaciation limits and lowest equilibrium line altitude for north and south Baffin Island), 45-59; (The Quaternary history of northern Cumberland Peninsula, east Baffin Island, N. W. T.: Part X: Radiocarbon date list), 261-277; *See also* Bradley, R. S.
Archaeology: Rocky Mountains, 332-335
Arctic: frost scars, 257-259; meteorological variation, 189-208; Quaternary geology, 45-60, 97-118, 261-277; snowy owl, 223-238; soil temperature regimes, 19-38; ultraviolet radiation, 39-43
Arthropod fallout on Alaskan snow. J. S. Edwards, 167-176
Atwater, M. A. *See* Lord, N. W., Pandolfo, J. P., and Atwater, M. A.
Audubon: new name for Colorado Front Range Neoglacial deposits formerly called "Arikaree." W. C. Mahaney, 355-357
Austria, Venedigergruppe, 72-83; 360-364
Autoregressive models, 340
Avalanches, in western Norway, 131-137
Avalanche Research Project, INSTAAR, 289-290

Bacteria, in frost scars, 257-260
Ball, G. E. *See* Karlstrom, T. N. V. and Ball, G. E.
Ballard, T. M. (Subalpine soil temperature regimes in southwestern British Columbia), 139-146
Barr, W. (review—*A Geomorphological Study of Post-Glacial Uplift with Reference to Arctic Canada*), 89-90
Barry, R. G. (review—*Climates of the Polar Regions*), 90-91
Biologically effective solar ultraviolet irradiation in the Arctic. M. M. Caldwell, 39-43
Bioenergetics of the snowy owl. J. A. Gessaman, 223-238
Biology. *See* Botany, Entomology
Biomass: in alder ecosystems, 239-254; in tundra, 301-304
Botany: plant communities in North Cascades, 147-164; tundra vegetation, 291-304
Boundary layer model, 190-208
Boyd, J. W. *See* Boyd, W. L., and Boyd, J. W.
Boyd, W. L. and Boyd, J. W. (Microorganisms in frost scars), 257-260
Bradley, R. S. (correspondence—The problem of inversions in estimating the height of glaciation limits in arctic regions), 359-360
Bristlecone pine, 61-71
Brown, J. *See* Nakano, Y. and Brown, J.
Bushnell, J. H. (review—*Antarctic Ecology* Vol. 2), 91-92

Caldwell, M. M. (Biologically effective solar ultraviolet irradiation in the Arctic), 39-43
Canada: archaeology, Rocky Mountains, 325-335; glaciation limit, Baffin Island, 45-58, 359-360; Eskimo place names, Baffin Island, 343-347, loose map; radiocarbon dates, Baffin Island, 261-277
Carbon-14 ($^{14}C$) dates, Baffin Island, 261-277
Chlorophyll distribution in arctic tundra, 307-322
Climatic change. *See* paleoclimatology
Cofer, C. (Differences in ablation of three adjacent alpine glaciers, Indian Peaks region, Front Range, Colorado), 349-353
Colorado: Audubon rock stratigraphic units, 355-357; glaciers, Front Range, 349-353; Neoglacial facies, Front Range, 119-129; stratigraphy, Front Range, 355-357
Corbin, S. *See* Wendler, G., Fahl, C., and Corbin, S.
Corley, N. T. (review—*Canada's Changing North*), 181
Correspondence
  Classification of organic soils, J. H. Day, 283
  Classification of organic soils: reply to comments of Mr. John H. Day, K. A. Everett, 238-284
  The problem of inversions in estimating the height of glaciation limits in arctic regions, R. S. Bradley, 359-360
  Venedigergruppe, Hohe Tauern, Austria, G. Patzelt, 360-362
  Venedigergruppe, Hohe Tauern, Austria: reply to comments of Dr. G. Patzelt, J. A. T. Young, 362-364

Day, J. H. (correspondence—Classification of organic soils), 283
Debris slopes as series. J. Thornes, 337-342
Deglaciation and isostasy in the Sukkertoppen ice cap area, west Greenland. D. Sugden, 97-117
Differences in ablation of three adjacent alpine glaciers, Indian Peaks region, Front Range, Colorado. C. Cofer, 349-353

Distribution of selected chemical elements in even-aged alder (*Alnus*) ecosystems near Fairbanks, Alaska. K. Van Cleve and L. A. Viereck, 239-255
Dormaar, J. F. *See* Reeves, B. O. K. and Dormaar, J. F.
Douglas, G. W. (Subalpine plant communities of the western North Cascades, Washington), 147-166
Dudley, K. F. (The Eskimo place names of northern Cumberland Peninsula, from Home Bay to Cape Dyer, Baffin Island, N. W. T., Canada, with English translations), 343-347; loose map

Editorial. INSTAAR'S Avalanche Research Project in southwestern Colorado, J. D. Ives, 289-290
Edwards, J. S. (Arthropod fallout on Alaskan snow), 167-176
Energy balance, arctic tundra, 189-208
Entomology: arthropod fallout, 167-176
Equilibrium line altitude, 45-58
The Eskimo place names of northern Cumberland Peninsula, from Home Bay to Cape Dyer, Baffin Island, N. W. T., Canada, with English translations. K. F. Dudley, 343-347; loose map
Everett, K. A. (correspondence—Classification of organic soils), 283-284

Facies, 119-129
Fahl, C. *See* Wendler, G., Fahl, C., and Corbin, S.
Floods, in western Norway, 131-137
Forest ecosystems, chemical elements in, 239-254
Fournier analysis, 140-142
Frost scars, 257-260

Geology: Quaternary geology, Baffin Island, 45-58, 261-277; stratigraphy, 355-357
Geomorphology: debris slopes, 337-342; facies, 119-129; landforms of deglaciation, 97-116; mass movement, 85-87, 131-138
Gessaman, J. A. (Bioenergetics of the snow owl), 223-238
Glacial landforms, 97-116
Glaciation limit, Baffin Island, 45-58, (fold-in maps) facing 44, 359-360
Glacier termini, 75-82
Glaciers: Brooks Range, 211-220; Colorado Front Range, 349-353; Venedigergruppe, 73-82; 362-364
Glacioisostatic deleveling, Baffin Island, 261
Glaciology: ablation in Colorado Front Range, 349-353; Baffin Island, 45-85; Brooks Range; 211-222; Venedigergruppe, 73-83, 360-364
Greenland, deglaciation and isostacy, 97-116
Grove, J. M. (The incidence of landslides, avalanches, and floods in western Norway during the Little Ice Age), 131-138
Hodgkiss, A. G. *Maps for Books and Theses* (review), *K. A. Salzburg*, 282
Holdgate, M. W. (ed.) *Antarctic Ecology*, Vol. 2 (review), J. H. Bushnell, 91-92
Holocene environments, Rocky Mountains, 328-335

Ice margins of the 19th and 20th centuries in the Venedigergruppe, Hohe Tauren, Austria. J. A. T. Young, 73-83
Iceland, debris slopes, 337
Ice wastage. *See* Ablation
The incidence of landslides, avalanches, and floods in western Norway during the Little Ice Age. J. M. Grove, 131-138
Information
  Canadian Arctic Resources Committee Workshop, 367-368
  International Conference on the Prehistory and Paleoecology of the Western North American Arctic and Subarctic, 367
  Reindeer/Caribou Symposium, 284
International Biological Programme: tundra vegetation, 291-304, U.S. IBP Tundra Biome site, Barrow, 1-18, 19-38, 39-43, 189-209, 307-323
International Hydrological Decade, 211-222
Isoglacihypes, facing 44, 47-50
Isostacy, 108-116; *See also* glacioisostatic deleveling
Ives, J. D. (Editorial—INSTAAR'S Avalanche Research Project in southwestern Colorado) 289-290; (review—*Ecology of the Subarctic Regions*), 365-366; (review—*The Kodiak Island Refugium*), 279-281

Jacobs, J. D. (review—*WMO Sea-Ice Nomenclature*), 180
Jostedalsbre, Norway, 131-137

Karlstrom, T. N. V. and Ball, G. E. (eds.), *The Kodiak Island Refugium* (review), J. D. Ives, 279-281

LaMarche, V. C., Jr. and Mooney, H. A. (Recent climatic change and development of the bristlecone pine (*P. longaeva Bailey*) krummholz zone, Mt. Washington, Nevada), 61-72
*Landskyld*, 132
Landslides, in western Norway, 131-137
Little Ice Age, 131-137
Lord, N. W., Pandolfo, J. P., and Atwater, M. A. (Simulations of meteorological variation over arctic coastal tundra under various physical interface conditions), 189-209

Macpherson, A. H. (review—*Animals of the Arctic: The Ecology of the Far North*), 366
Madole, R. F. (Neoglacial facies in the Colorado Front Range), 119-130
Mahaney, W. C. (Audubon: new name for Colorado Front Range Neoglacial deposits formerly called "Arikaree"), 355-357
Mass balance studies on McCall Glacier, Brooks Range, Alaska. G. Wendler, C. Fahl, and S. Corbin, 211-222
Mass movement, 85-87, 131-137
Mathematical modeling and simulation: primary production, 1-18; tundra soil temperature, 19-38; meteorological variation, 189-207

Mathematical modeling and validation of the thermal regimes in tundra soils, Barrow, Alaska. Y. Nakano and J. Brown, 19-38
Metabolism, of snowy owl, 224-236
Meteorology: variation over arctic tundra, 189-208
Microbiology: bacteria in frost scars, 257-260
Microorganisms in frost scars. W. L. Boyd and J. W. Boyd, 257-260
Miller, G. H. *See* Andrews, J. T. and Miller, G. H.
Miller, P. C. and Tieszen, L. (A preliminary model of processes affecting primary production in the arctic tundra), 1-18
Mooney, H. A. *See* LaMarche, V. C., Jr. and Mooney, H. A.

Nakano, Y. and Brown, J. (Mathematical modeling and validation of the thermal regimes in tundra soils, Barrow, Alaska), 19-38
Neoglacial facies in the Colorado Front Range. R. F. Madole, 119-130
Nevada, bristlecone pine, 61-71
Nival fauna, 167-176
Norway, Little Ice Age, 131-137
Numerical simulation. *See* mathematical modeling and simulation
Nutrient elements, in alder ecosystems, 239-254
*Nyctea scandiaca. See* snowy owl

Olsson, I. U. *Radiocarbon Variations and Absolute Chronology* (review), *J. T. Andrews,* 281-282
Organic soils, classification of, 283-284
Ornithology: snowy owl, 223-238
Orvig, S. (ed.) *Climates of the Polar Regions* (review), *R. G. Barry,* 90-91

Paleoclimatology, 68-71
Paleosols, Rocky Mountains, 328-331, 334-335
Pandolfo, J. P. *See* Lord, N. W., Pandolfo, J. P., and Atwater, M. A.
A partial Holocene pedological and archaeological record from the southern Alberta Rocky Mountains. B. O. K. Reeves and J. F. Dormaar, 325-336
Patzelt, G. (correspondence—Venedigergruppe, Hohe Tauern, Austria, 360-362
Permafrost, 19-38, 189-198
Photosynthesis, 3-18
Place names, Baffin Island, 343-347; loose map
Plant communities, North Cascades, 150-161
Postglacial rebound, *See* glacioisostatic deleveling and isostacy
A preliminary model of processes affecting primary production in the arctic tundra. P. C. Miller and L. Tieszen, 1-18
Protalus, 85-87
Primary production in arctic tundra, 4-18, 307-322

Quaternary Geology, Baffin Island, 45-58, 261-277
Quaternary history of northern Cumberland Peninsula, Baffin Island, N. W. T., Canada: Part IV: Maps of the present glaciation limits and lowest equilibrium line altitude for north and south Baffin Island. J. T. Andrews and G. H. Miller, 45-59
The Quaternary history of northern Cumberland Peninsula, east Baffin Island, N. W. T.; Part X: Radiocarbon date list. J. T. Andrews and G. H. Miller, 261-277

Radiocarbon dates, Baffin Island, 261-277
Raised marine landforms, 108-115
Recent climatic change and development of the bristlecone pine (*P. longaeva* Bailey) krummholz zone, Mt. Washington, Nevada. V. C. LaMarche, Jr. and H. A. Mooney, 61-72
Reeves, B. O. K. and Dormaar, J. F. (A partial Holocene pedological and archaeological record from the southern Alberta Rocky Mountains, 325-336
Reindeer/caribou symposium, 284
Reviews
*Animals of the Arctic: The Ecology of the Far North.* B. Stonehouse, *A. H. Macpherson,* 366
*Antarctic Ecology* vol. 2, edited by M. W. Holdgate, *J. H. Bushnell,* 91-92
*Canada's Changing North,* edited by W. C. Wonders, *N. T. Corley,* 181
*Climates of the Polar Regions,* edited by S. Orvig, *R. G. Barry,* 90-91
*Ecology of the Subarctic Regions: Ecologie des Regions Subarctique. Proceedings of the Helsinki Symposium.* UNESCO, *J. D. Ives,* 365-366
*A Geomorphological Study of Post-Glacial Uplift with Reference to Arctic Canada,* J. T. Andrews, *W. Barr,* 89-90
*The Kodiak Island Refugium.* T. N. V. Karlstrom and G. E. Ball (eds.), *J. D. Ives,* 279-281
*Maps for Books and Theses.* A. G. Hodgkiss, *K. A. Salzberg,* 282
*Meddelelser om Grønland,* Bd. 176, *S. E. White,* 177-180
*Radiocarbon Variations and Absolute Chronology.* I. U. Olsson (ed.), *J. T. Andrews,* 281-282
*WMO Sea-Ice Nomenclature,* Secretariat of WMO, *J. D. Jacobs,* 180
Rock stratigraphic units, Audubon, 355-357
Rocky Mountains, Neoglacial succession, 355-357

Salzberg, K. A. (review—*Maps for Books and Theses*), 282
The seasonal course of aboveground production and chlorophyll distribution in a wet arctic tundra at Barrow, Alaska. L. L. Tieszen, 307-324
Simulations of meteorological variation over arctic coastal tundra under various physical interface conditions. N. W. Lord, J. P. Pandolfo, M. A. Atwater, 189-209
Slopes, 337-342
Snowy owl, 223-236

Snowlines, Baffin Island, 46-47
Soils: alluvial, 240-250; chemical elements in, 239-254; classification of, 283-284; conductivity, 19-38; moisture 19-38; North Cascades, 154-155, 161-164; temperature, 139-145; thermal regime, 19-38
Solar radiation, 39-42
Stonehouse, B. *Animals of the Arctic: The Ecology of the Far North* (review), *A. H. Macpherson*, 366
Stratigraphy: Neoglacial succession in Rocky Mountains, 355-357
Subalpine plant communities of the western North Cascades, Washington. G. W. Douglas, 147-166
Subalpine soil temperate regimes in southwestern British Columbia. T. M. Ballard, 139-146
Succession, in alder ecosystems, 239-255
Sugden, (Deglaciation and isostasy in the Sukkertoppen ice cap area, west Greenland), 97-117
Sukkertoppen, Greenland, 97-116

Talus, 337; *See also* debris slopes and protalus
Temperature amplitude in soils, 139-145
Temperature damping depth, 140-145
Temperature inversions, Baffin Island, 359-360
Temperature, ground, 200-208
Thermal diffusivity of soils, 142-145
Thornes, J. (Debris slopes as series), 337-342
Tieszen, L. L. (The seasonal course of aboveground production and chlorophyll distribution in a wet arctic tundra at Barrow, Alaska), 307-324; *see also* Miller, P. C. and Tieszen, L.
Time series analysis, 337
Transpiration, 9-15
Tundra: meteorological variations over, 189-208; primary production, 4-18, 307-322; soil thermal regimes, 19-38

Ultraviolet radiation, 39-42
UNESCO *Ecology of the Subarctic Regions: Ecologie des Regions Subarctique* (review), *J. D. Ives*, 365-366

Van Cleve, K. and Viereck, L. A. (Distribution of selected chemical elements in even-aged alder (*Alnus*) ecosystems near Fairbanks, Alaska), 239-255
Vegetation types and plant biomass in tundra. F. E. Wielgolaski, 291-305
Viereck, L. A. *See* Van Cleve, K. and Viereck, L. A.

Washington: plant communities in North Cascades, 147-164
Weather and climate fluctuations, 80
Wendler, G., Fahl, C., and Corbin, S. (Mass balance studies on McCall Glacier, Brooks Range, Alaska), 211-222
White, S. E. (review—*Meddeleser om Grøland*, Bd. 176), 177-180
Wielgolaski, F. E. (Vegetation types and plant biomass in tundra), 291-305
Winter protalus mounds; Brooks Range, Alaska. W. E. Yeend, 85-87
WMO, Secretariat of, *WMO Sea-Ice Nomenclature* (review), *J. D. Jacobs*, 180
Wonders, W. C. (ed.), *Canada's Changing North* (review), *N. T. Corley*, 181
Yeend, W. E. (Winter protalus mounds; Brooks Range, Alaska), 85-87
Young, J. A. T. (correspondence—Venediger-gruppe, Hohe Tauern, Austria: reply to comments of Dr. G. Patzelt), 362-364; (Ice margins of the 19th and 20th centuries in the Venediger-gruppe, Hohe Tauern, Austria), 73-83